इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 8932 (1978): Preformed metal screw caps for glass containers [MTD 32: Metal Containers]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 8932 - 1978
(Reaffirmed 2001)

“पुनः पुष्ट १९९०

“REAFFIRMED 1990

Indian Standard
SPECIFICATION FOR PREFORMED METAL SCREW CAPS FOR GLASS CONTAINERS

UDC 683·533·8 : 666·171·92—45

© *Copyright* 1979

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 8

Price Rs 6·00

April 1979

Indian Standard
SPECIFICATION FOR PREFORMED METAL SCREW CAPS FOR GLASS CONTAINERS

Metal Containers Sectional Committee, MCPD 12

Chairman	*Representing*
Shri L. Sikand	The Metal Box Company of India Ltd, Calcutta
Members	
Shri J. K. Khosla (*Alternate* to Shri L. Sikand)	
Shri V. P. Agarwal	Hindustan Steel Limited, Rourkela
Shri P. B. Rao (*Alternate*)	
Shri B. R. Ajmani	Hindustan Petroleum Corporation Ltd, Bombay
Shri K. Sundaram (*Alternate*)	
Shri P. R. Bhagwat	Railway Board (Ministry of Railways)
Shri D. P. Bhattacharjee	Export Inspection Council of India (Ministry of Foreign Trade), Calcutta
Shri R. C. Palhan (*Alternate*)	
Shri C. B. Chugh	Directorate General of Technical Development, New Delhi
Shri K. A. Srivastava (*Alternate*)	
Shri M. K. Day	M. L. Day and Company, Calcutta
Shri N. Roy (*Alternate*)	
Shri V. V. Ghotge	Balmer Lawrie & Co Ltd, Bombay
Shri A. P. Joseph (*Alternate*)	
Shri P. K. Gupta	Containers and Closures Limited, Calcutta
Shri A. K. Basu (*Alternate*)	
Shri R. C. Jhingan	Indian Oil Corporation Ltd, Bombay
Shri M. A. Mathew (*Alternate*)	
Shri G. S. Kadbet	Poysha Industrial Company Limited, Bombay
Shri S. Chatterjee (*Alternate*)	
Shri P. D. Katrak	Zenith Tin Works Ltd, Bombay
Shri A. R. A. Krishnan	Ministry of Defence (DGI)
Maj S. K. Misra (*Alternate*)	
Shri B. Kumar	I.C.I. (India) Pvt Ltd, Calcutta
Shri R. Krishnan (*Alternate*)	
Shri N. C. Magotra	The Tinplate Company of India Ltd, Calcutta
Shri P. K. Banerjee (*Alternate*)	
Shri I. N. Murty	Department of Explosives, Nagpur
Shri Charanjit Lal (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1979

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act

(*Continued from page* 1)

Members	*Representing*
DR A. G. NAIK-KURADE	All India Food Preservers' Association, New Delhi
SHRI Y. K. KAPOOR (*Alternate*)	
SHRI P. V. NARAYANAN	Indian Institute of Packaging, Bombay
SHRI K. B. GUPTA (*Alternate*)	
SHRI A. R. VIJAYENDRA RAO	Central Food Technological Research Institute, (CSIR), Mysore
SHRI HARSHAD F. SHAH	The Indian Paint Association, Calcutta
SHRI D. B. CHATTERJEE (*Alternate*)	
SHRI BALBIR ONKAR SINGH	Tri-Sure India Limited, Bombay
SHRI S. SINGARAVELU (*Alternate*)	
SHRI S. C. SINGHAL	Vanaspati Manufacturers' Association of India, Bombay
SHRI RAJ KAPILA (*Alternate*)	
SHRI P. SUBRAHMANYAM	Directorate of Vanaspati, Vegetable Oils & Fats (Ministry of Commerce, Civil Supplies & Co-operation), New Delhi
DR I. A. SIDDIQI (*Alternate*)	
SHRI J. S. UPPAL	Directorate of Marketing and Inspection (Ministry of Agriculture & Irrigation), Faridabad
DR S. JAYARAMAN (*Alternate*)	
SHRI K. VENKATESWARAN	Directorate of Weights and Measures (Ministry of Commerce, Civil Supplies & Co-operation), New Delhi
SHRI SAMIUL HAQUE (*Alternate*)	
SHRI P. S. DAS Director (MCPD)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI A. R. GULATI
Deputy Director (MCPD), ISI

Metal Closures for Glass Containers Subcommittee, MCPD 12 : 7

Convener	
SHRI J. K. KHOSLA	The Metal Box Company of India Ltd, Calcutta
Members	
SHRI K. R. NARASIMHAN (*Alternate* to Shri J. K. Khosla)	
SHRI P. C. AMIN	Alembic Chemical Works Co Ltd, Vadodara
SHRI J. C. PANCHAL (*Alternate*)	
SHRI S. M. BHAGAT	Zenith Tin Works Limited, Bombay
SHRI P. D. KATRAK (*Alternate*)	
SHRI P. K. GUPTA	Containers and Closures Limited, Bombay
SHRI M. K. CHATTERJEE (*Alternate*)	
SHRI G. S. KADBET	Poysha Industrial Company Limited, Bombay
LT-COL KAPILMOHAN	All India Distillers' Association, New Delhi
SHRI K. R. MALHOTRA	India Foils Ltd, Calcutta
SHRI A. RAY (*Alternate*)	
MAJ S. K. MISRA	Ministry of Defence (DGI)
SHRI V. K. BAJPAI (*Alternate*)	

(*Continued on page* 11)

Indian Standard
SPECIFICATION FOR PREFORMED METAL SCREW CAPS FOR GLASS CONTAINERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 29 September 1978, after the draft finalized by the Metal Containers Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 With the introduction of high speed filling and capping machines, standardization of the dimensions of the glass bottles neck and metal screw caps is necessary to achieve interchangeability of the screw caps on glass bottles purchased from different sources. With the formulation of this standard capping problems like leakage, deterioration of the product packed or difficulties in screwing and unscrewing the caps will be eliminated to a great extent.

0.3 This standard deals primarily with the dimensions of shallow continuous thread finishes on glass bottles widely known as 'R-3/2' finishes. The corresponding dimensions for 'R-3/2' glass bottle neck finishes have been taken from BS 1918 : 1953 'Glass container finishes', issued by the British Standards Institution.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of a significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and dimensions for metal screw caps for glass containers with neck finish according to Table 1.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 1394-1973† shall apply.

---

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to metal containers trade (*second revision*).

3. REQUIREMENTS

3.1 Dimensions — The metal screw caps shall have dimensions and tolerances as specified in Table 2.

3.2 Material

3.2.1 Metal screw caps shall be manufactured from tinplate or aluminium sheet. The aluminium sheet shall be conforming to designation 40 800 or 31 000 of IS : 737-1974* in H_2 or H_3 condition. The aluminium sheet thickness for different sizes of a closure shall be as under:

For caps up to and including 28 mm size	0·20 ±0·02 mm
For caps above 28 mm size	0·23 ±0·02 mm

3.2.1.1 For tinplate screw caps the nominal tinplate sheet thickness shall be as under:

For caps up to and including 28 mm size	0·18 mm
For caps above 28 mm and up to and including 66 mm	0·20 mm and
For caps above 66 mm size	0·23 mm

3.2.2 Wad may be manufactured from pulp board, faced pulp board, cork, faced cork, rubber or any other suitable material. The wad diameter shall be such that it is retained by the bead on the shell when assembled. The wad or wad facing shall be compatible with the product and shall be non-toxic when used for containers for packing food products.

3.3 Manufacture

3.3.1 The shell for producing metal screw cap shall be drawn on a power press. Knurling, threading and curling shall be carried out on the shell on a thread rolling machine.

3.3.2 *Finish* — The metal screw cap shall be in a new and clean condition, free from all foreign matter. It shall be given an internal protective coating, and an external protective/decorative coating.

3.4 Assembly — The metal screw cap with the wad shall be screwed on to the container neck manually or by means of a cap screwing machine.

4. SAMPLING AND TESTING

4.1 Samples of metal screw caps shall be drawn in accordance with IS : 6941-1973† and shall be tested for the tests given in **4.2** to **4.4**.

---

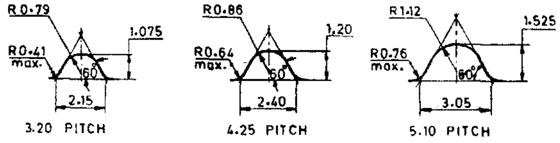
*Specification for wrought aluminium and aluminium alloys, sheet and strip (for general engineering purposes) (*second revision*).

†Methods for sampling metal closures.

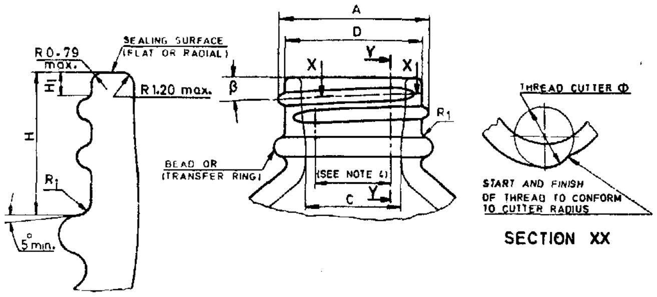
TABLE 1 GLASS CONTAINER NECK FINISH

(*Clause* 1.1)

All dimensions in millimetres.



THREAD CROSS SECTION



SECTION XX

ENLARGED SECTION YY

No. or Size	*A*	*D*	*H*	*C* *Min*	R_1 *Max*	H_1	β	Thread Cutter Dia	Pitch
18	17·65±0·25	15·50±0·25	$9{\cdot}05^{+0{\cdot}20}_{-0{\cdot}18}$	8·25	1·05	$1{\cdot}15^{+0{\cdot}40}_{-0{\cdot}38}$	3° 30′	9·50	3·20
20	19·65±0·25	17·50±0·25	$9{\cdot}05^{+0{\cdot}20}_{-0{\cdot}18}$	10·25	1·05	$1{\cdot}15^{+0{\cdot}40}_{-0{\cdot}38}$	3° 7′	9·50	3·20
22	21·65±0·25	19·50±0·25	$9{\cdot}05^{+0{\cdot}20}_{-0{\cdot}18}$	12·25	1·05	$1{\cdot}15^{+0{\cdot}40}_{-0{\cdot}38}$	2° 49′	9·50	3·20
24	23·60±0·25	21·45±0·25	$9{\cdot}80^{+0{\cdot}20}_{-0{\cdot}18}$	13·10	1·05	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	2° 34′	9·50	3·20
28	$27{\cdot}30^{+0{\cdot}33}_{-0{\cdot}31}$	$24{\cdot}90^{+0{\cdot}33}_{-0{\cdot}31}$	$9{\cdot}80^{+0{\cdot}20}_{-0{\cdot}18}$	15·60	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	2° 57′	12·70	4·25
33	$31{\cdot}80^{+0{\cdot}33}_{-0{\cdot}31}$	$29{\cdot}40^{+0{\cdot}33}_{-0{\cdot}31}$	9·85±0·25	20·10	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	2° 31′	12·70	4·25
38	$37{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$34{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	9·85±0·25	25·05	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	2° 9′	12·70	4·25
40	$39{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	$37{\cdot}20^{+0{\cdot}46}_{-0{\cdot}43}$	9·85±0·25	27·70	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	2° 1′	12·70	4·25
43	$41{\cdot}50^{+0{\cdot}46}_{-0{\cdot}43}$	$39{\cdot}10^{+0{\cdot}46}_{-0{\cdot}43}$	9·85±0·25	29·60	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 55′	12·70	4·25
48	$47{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$44{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	9·85±0·25	35·10	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 41′	12·70	4·25
51	$49{\cdot}50^{+0{\cdot}46}_{-0{\cdot}43}$	$47{\cdot}10^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	37·55	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 36′	12·70	4·25
53	$52{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$49{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	40·10	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 31′	12·70	4·25
58	$56{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$53{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	44·05	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 25′	12·70	4·25
60	$59{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$56{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	47·05	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 20′	12·70	4·25
63	$62{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$59{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	50·10	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 16′	12·70	4·25
66	$65{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$62{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	53·10	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 14′	12·70	4·25
70	$69{\cdot}00^{+0{\cdot}46}_{-0{\cdot}43}$	$66{\cdot}60^{+0{\cdot}46}_{-0{\cdot}43}$	10·00±0·38	57·10	1·20	$1{\cdot}15^{+0{\cdot}41}_{-0{\cdot}38}$	1° 8′	12·70	4·25
77	76·60±0·51	73·55±0·51	12·00±0·38	64·00	1·50	$1{\cdot}55^{+0{\cdot}41}_{-0{\cdot}38}$	1° 14′	12·70	5·10
83	82·50±0·51	79·45±0·51	12·00±0·38	69·95	1·50	$1{\cdot}55^{+0{\cdot}41}_{-0{\cdot}38}$	1° 9′	12·70	5·10
89	88·70±0·51	85·65±0·51	13·20±0·38	74·10	1·50	$1{\cdot}55^{+0{\cdot}41}_{-0{\cdot}38}$	1° 4′	12·70	5·10
100	99·50±0·51	96·45±0·51	14·80±0·38	84·95	1·50	$1{\cdot}55^{+0{\cdot}41}_{-0{\cdot}38}$	0° 56′	12·70	5·10
120	119·50±0·51	116·45±0·51	17·00±0·38	104·95	1·50	$1{\cdot}55^{+0{\cdot}41}_{-0{\cdot}38}$	0° 47′	12·70	5·10

NOTE 1 — '*H*' dimension represents distance from top of finish down to point where line tangent to '*A*' intersects top of bead or shoulder.

NOTE 2 — β = Helix angle or angle of fixture to cutter.

NOTE 3 — $\tan \beta = \dfrac{\text{Pitch}}{\pi\,(\text{mean between mean '}A\text{' and mean '}D\text{'})}$

NOTE 4 — A minimum of one and a quarter complete turns of full thread projection should be maintained.

NOTE 5 — Contour of bead (or transferring) to be optional provided top of bead clears a 5° *Min* downward angle.

NOTE 6 — '*C*' dimension is intended for filling tube clearance and is measured through full length of finish.

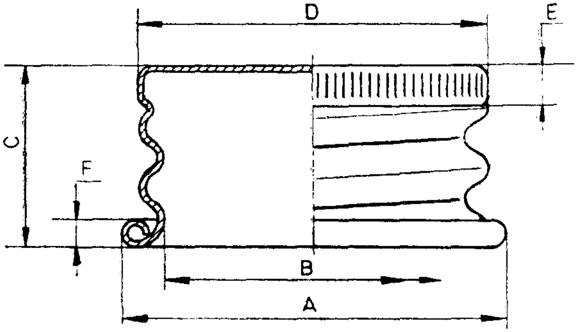
NOTE 7 — All essential dimensions may be ascertained by any standard form of measurement except that the minimum '*A*' dimension shall be measured by a gauge. The gap of this gauge shall be the minimum '*A*' dimension and shall have two engaging surfaces conforming to the thread circumference. The width of these surfaces shall be one-twentieth of the circumference of the '*A*' dimension.

As in the Original Standard, this Page is Intentionally Left Blank

TABLE 2 DIMENSIONS FOR METAL SCREW CAPS

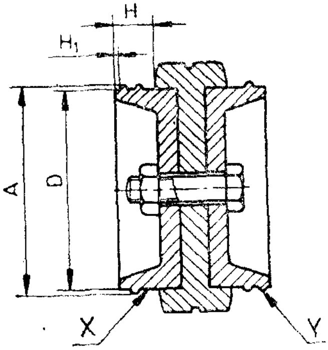
(*Clauses* 3.1 *and* 4.2)

All dimensions in millimetres.



SIZE	*A* ±0·20	*B* ±0·15	*C* ±0·10	*D* ±0·15	*E* ±0·15	*F* ±0·10	PITCH
18	20·30	16·35	9·40	8·35	2·05	1·30	3·20
20	22·50	18·35	9·90	20·45	2·05	1·30	3·20
22	24·70	20·35	10·40	22·65	2·05	1·30	3·20
24	26·60	22·35	10·40	24·55	2·05	1·30	3·20
28	30·20	26·05	11·10	28·15	2·05	1·30	4·25
33	34·60	30·45	11·10	32·55	2·55	1·30	4·25
38	40·10	35·65	11·00	38·15	2·55	1·30	4·25
40	42·70	38·25	9·80	40·75	2·55	1·30	4·25
43	45·10	40·05	11·20	42·45	2·55	1·30	4·25
48	50·20	45·55	11·10	48·15	2·55	1·30	4·25
51	52·50	48·05	10·40	56·45	2·55	1·30	4·25
53	55·10	50·75	10·80	53·15	2·55	1·30	4·25
58	59·50	54·15	10·60	57·05	2·55	1·60	4·25
60	62·10	57·55	10·60	60·05	2·55	1·60	4·25
63	65·60	60·55	10·60	63·15	2·55	1·60	4·25
66	68·20	63·55	11·10	66·05	2·55	1·60	4·25
70	72·30	67·25	10·80	70·15	2·55	1·60	4·25
77	80·20	75·05	12·60	77·65	3·25	1·60	5·10
83	86·20	80·95	12·10	83·65	3·25	1·60	5·10
89	92·40	87·15	14·20	89·65	3·25	1·60	5·10
100	102·30	98·95	15·10	100·35	4·05	1·80	5·10
120	122·80	117·95	17·20	120·35	4·05	1·80	5·10

4.2 Samples shall be tested for all dimensions as in Table 2 with the help of appropriate instruments and by using the gauge as shown in Fig. 1.



'*X*' side of gauge to be made to the maximum *A* and *D*, and minimum *H* dimensions shown in Table 1. Dimension H_1 to be the minimum shown in Table 1.

'*Y*' side of gauge to be made to the minimum *A*, *D* and *H* and maximum H_1 dimensions as shown in Table 1.

NOTE 1 — '*H*' dimension represents distance from top of finish down to point where line tangent to *A* intersects top of bead or shoulder.

NOTE 2 — Pitch thread profile, and fixed dimensions for both sides of gauge, to be as shown in Table 1.

NOTE 3 — When the cap is fitted with its sealing medium and is applied as in capping, clearance must be apparent between the bottom of the cap and the gauge. Caps shall fit both sides of the gauge.

FIG. 1 SCREW CAP GAUGE

4.3 Test for Thread Flattening — The metal screw cap shall be opened and closed over a container at least 25 times ensuring that the closing torque conforms to the values given in Table 3. Closing torque may be tested by clamping the container on a torque tester, applying the torque by hand in tightening the cap and reading the torque directly on the scale of the torque tester shown in Fig. 2. The container on which this test is conducted shall have neck finish with various dimensions at the mean of the tolerance limits. The cap, after testing in this manner, shall not have its threads flattened and shall still be in a condition to be used for closing the container.

4.4 Leakage Test — A container fitted with the metal screw cap shall be filled with a 10 percent solution of a surface active reagent, such as lissapol leaving normal head space. The metal screw cap with a proper wad shall be hand-tightened on the container to the torque value specified in Table 3. A blotting paper or absorbant cotton wool shall be wrapped around the screw cap to detect any leakage. The closed container shall then be stored on its side for 48 hours at 43°C. The position of the container may be changed slightly every two hours to complete one rotation every 12 hours. After the test the container shall be examined for any leakage which would be noticed by the stains on the blotting paper or absorbant cotton.

TABLE 3 CLOSING TORQUE FOR METAL SCREW CAPS

(*Clauses* 4.3 *and* 4.4)

SIZE	CLOSING TORQUE (N.cm)
18	70-110
20	80-140
22	90-160
24	105-175
28	125-210
33	150-250
38	170-290
40	185-310
43	195-330
48	220-370
51	230-390
53	240-410
58	265-460
60	275-485
63	290-495
66	300-520
70	320-550
77	380-610
83	410-645
89	435-690
100	505-760
120	540-830

5. MARKING

5.1 If required by the purchaser, the metal screw cap may be marked, clearly and indelibly, with the name, initials or recognized trade-mark of the manufacturer.

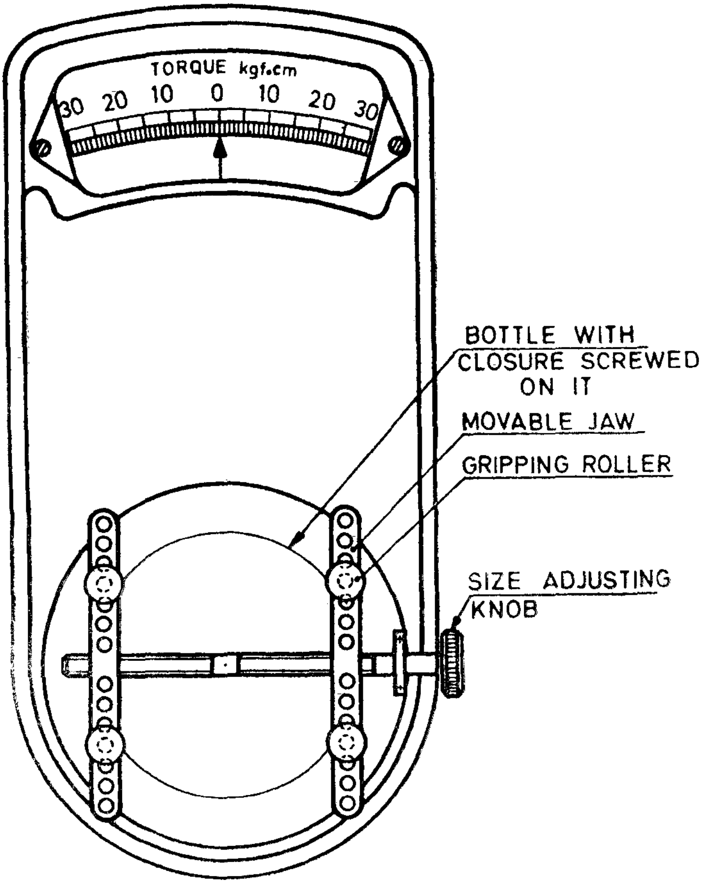


FIG. 2 TORQUE TESTER

5.1.1 The metal screw caps may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

(*Continued from page* 2)

Members	*Representing*
Shri C. K. Somany	Hindustan National Glass & Industries Limited, Calcutta
Shri R. K. Gupta (*Alternate*)	
Shri V. S. Sundaram	Glaxo Laboratories (India) Limited, Bombay
Shri H. K. Upadhyaya	Larsen & Toubro Limited, Bombay
Shri J. S. Uppal	Directorate of Marketing & Inspection (Ministry of Agriculture & Irrigation), Faridabad
Shri S. Jayaraman (*Alternate*)	
Shri Yaseen A. Vaziralli	Vazir Glass Works Limited, Bombay
Shri S. D. Marketkar (*Alternate*)	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 0·101 972 kgf
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2